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U.S. Department of the Interior
Bureau of Land Management

FINAL

Oregon State Office
P.O. Box 2965, 1300 N.E. 44th Avenue
Portland, Oregon 97208

December 1992

Pacific Yew Comprehensive Management Strategy

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As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interest of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

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United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Oregon State Office
P.O. Box 2965 (1300 N.E. 44th Avenue)
Portland, Oregon 97208

IN REPLY REFER TO
5800(933)

Dear Reader:

Enclosed is the Final Pacific Yew Management Strategy prepared in response to Congressional direction in the Fiscal Year 1992 Interior Appropriations Act. This document reflects the goal set by Congress for the Bureau of Land Management to develop a strategy for "ensuring a sustainable supply of Pacific yew for the medical community with the least impact to the environment and to the Pacific yew resource." It also reflects your input through your responses to the Pacific Yew Issues Mailer (distributed in March 1992) and the Draft Pacific Yew Comprehensive Management Strategy (published in June 1992).

This document represents more of a verification process than an action process. As stated in the introduction section, a variety of programs already in progress or in the planning stages were found to address most of the issues considered relevant to the Congressional goal. Rather than duplicate those efforts, the task force compiled information about the various programs, compared their purposes to the issues raised by task force members and by reviewers of the Issues Mailer and the Draft Strategy, documented how each program addresses the relevant issues, and made recommendations for additional programs considered necessary to achieve a comprehensive strategy for management of the Pacific yew.

The overall strategy, then, is to complete the various plans and programs that together will achieve the goal of ensuring a sustainable yew supply while causing the least environmental impacts. The most directly relevant program currently being documented for public review in January 1993 is the Pacific Yew Environmental Impact Statement effort. This joint effort between the USDA Forest Service (Lead Agency) and the Bureau of Land Management and Food and Drug Administration (Cooperating Agencies) is described in more detail, along with the other yew-related programs, in the enclosed document.

As directed by Congress, this strategy was developed by a multidisciplinary task force, which included BLM representatives from Oregon, Washington, Idaho and California and a representative from USDA Forest Service Region 6. The BLM Oregon-Washington State Office has been the lead for preparation of the strategy, which is being released on behalf of the other BLM state organizations represented.

Thank you for your participation and interest in this important natural resource issue.

Sincerely,

D. Dean Bibles
State Director

U.S. Department of Interior
Bureau of Land Management

FINAL

Pacific Yew Comprehensive Management Strategy

Prepared by
Pacific Yew Strategy Task Force

December 1992

State Director
California

State Director
Oregon/Washington

State Director
Idaho

II

FINAL

PACIFIC YEW COMPREHENSIVE MANAGEMENT STRATEGY

U.S. Department of Interior
Bureau of Land Management

I. Introduction and Background

In November 1991, Congress directed the Bureau of Land Management (BLM) to "develop a comprehensive strategy document for ensuring a sustainable supply of Pacific yew for the medical community with the least impact to the environment and to the Pacific yew resource." This document has been prepared to fulfill the Congressional direction and to serve as a guide to the many programs being undertaken for the management of the Pacific yew on Public Lands.

Pacific yew, *Taxus brevifolia*, had been primarily known to local residents and Native Americans in areas where it grows. It is a diminutive and infrequently occurring tree species in American northwestern forests. Until recently, very little economic value had been attributed to the Pacific yew, although Native Americans and local residents have utilized its wood for such specialty products as arrow and harpoon shafts, bows, canoe paddles, digging sticks, musical instruments, wood crafting, furniture and fence posts. It was even favored in ancient times by Inuits for constructing halibut hooks. Special preparations of Pacific yew wood, needles and bark have been used medicinally by northwestern Native Americans to treat wounds, to gain strength, to relieve internal pain or injury and as a lung medicine. There is also some evidence of historical use of yew tree parts to concoct poisons.

In a little over a year, awareness of the Pacific yew escalated from a level of relative obscurity to one of national prominence with the discovery that the yew contains a substance, taxol, which has produced promising clinical results in the treatment of cancer.

Pacific yew was first collected for cancer research in 1962 as part of a large-scale screening program by the National Cancer Institute (NCI) to identify new plant-derived materials for use in treating cancer. Two years later a crude extract from the bark was found to have cytotoxic (cell growth inhibiting) activity. Continued investigations revealed that extract from the bark produced more consistent, high-level results than other parts of the tree. Under contract to NCI, Dr. Monroe Wall at Research Triangle Institute began studies in 1965 to isolate the active compound in the bark extract. Wall's group identified diterpene amide (taxol), a very complex compound, to be the active substance in yew bark extract.

Further development of taxol was delayed due to its structural complexity and a lack of understanding about the mechanism of its activity in suppressing cancer cell growth. In 1977, Dr. Susan Horowitz, working with a graduate student at Albert Einstein College of Medicine, began research using taxol in human tumor cells. She learned that taxol inhibited cell division. Horowitz is credited with discovering the mechanism of taxol's activity.

Following an acceptable formulation of the drug, toxicology studies were begun in 1980. By 1982, NCI approved the drug for filing an Investigational New Drug Application with the Food and Drug Administration (FDA). Clinical trials were begun in 1983 to test the drug for dosage and toxicity. In 1987, NCI contracted for the collection of 60,000 pounds of bark to continue clinical tests. In 1988, after a group from Johns Hopkins University found a 30% improvement following taxol treatments in patients with advanced ovarian cancer, events began to unfold rapidly. In 1989, NCI contracted for another 60,000 pounds of yew bark to conduct further clinical trials.

Because of the finite quantity of yew bark and the potential for its harvest to impact forest environments, several researchers in the medical community identified a need to find alternative sources of taxol. NCI Director Samuel Broder announced taxol research as an emergency priority in 1991 and committed $1 million to developing an alternative source for taxol suitable for mass production. In addition, NCI advertised for a private collaborator to continue development of taxol for licensing by FDA. Following a competitive process, Bristol-Myers Squibb (B-MS) was selected as an NCI partner in a Collaborative Research and Development Agreement (CRADA) in January 1991. In June of 1991, the Departments of Health and Human Services, Agriculture and Interior signed a Memorandum of Understanding to support the purposes of the CRADA. In July 1991, the Secretaries of Agriculture and Interior signed cooperative agreements with B-MS in support of the CRADA objectives. The cooperative agreements commit the agencies to supply Pacific yew for the development of taxol for use in humans. In return, B-MS committed to financially support the agencies' Pacific yew programs.

In preparing to implement the cooperative agreements, both agencies realized that yew harvesting would need to occur on a broader scale than just within timber sale contract areas to meet the target quantity of bark established by NCI and B-MS. The agencies then began development of Pacific Yew Conservation and Biological Guidelines to ensure the sustainability of the species while harvesting bark.

Not surprisingly, a natural resource subject of such accelerated prominence is prone to controversy. In this case, both the species and the CRADA fell under the scrutiny of several Congressional committees. One outcome of this Congressional attention was the direction for BLM to establish a multi-disciplinary task force to develop this long-term strategy for sustainable management of Pacific yew.

The task force, established in December 1991, included BLM representatives from Oregon, Washington, California and Idaho and a representative from the U.S. Forest Service. Skills and experience applied to the task included forestry, environmental protection, forest genetics, wildlife biology, botany, law enforcement and resource management. The task force members are listed on the inside back cover.

In setting out to accomplish the goals set by Congress, the task force realized that a variety of Pacific yew programs, under the auspices of BLM, the Forest Service, or both agencies jointly, were already in progress or were in the planning stages. These programs were found to address most of the issues considered relevant to the goals set by Congress with respect to ensuring sustainable Pacific yew supplies for the medical community while causing the least impact to the environment and to the Pacific yew itself. Rather than duplicate these efforts, the primary tasks for the group became to summarize the various ongoing and planned programs, to portray their relationships to each other and to the issues involved in meeting the goals of Congress, and to recommend any additional programs considered necessary to achieve a comprehensive strategy for management of the Pacific yew.

On August 7, 1992, the President signed the Pacific Yew Act. This Act converted into law many of the initiatives BLM and the Forest Service have already implemented with regard to Pacific yew. In addition, the Act authorizes BLM to sell Pacific yew to parties manufacturing taxol in the United States in accordance with section 505 of the Federal Food, Drug and Cosmetic Act and requires BLM and the Forest Service to make reports to Congress.

II. Current and Planned Pacific Yew Programs

This section describes the various programs currently underway or in the planning stages that address management of Pacific yew. The interrelationships between these programs are also described.

Pacific Yew Administrative Policies: Pacific yew administrative policies have been developed in the BLM Oregon/Washington State Office to guide field managers in the management and harvesting of Pacific yew. The policies were developed within the parameters of existing laws, regulations, policies, plans and programs. These guidelines have been adapted by Idaho and California State Directors for application in their respective field offices.

The Pacific yew administrative policies include:

1. Instructions for prioritizing the harvest of Pacific yew.

2. Procedures for strict accountability and monitoring of all Pacific yew harvest and transportation to minimize the opportunities for unauthorized use and theft of Pacific yew resources.

3. Requirements for protection of sensitive information relating to specific locations of Pacific yew.

4. Directions for field managers to make every effort to pre-harvest Pacific yew bark in existing timber contracts prior to the harvest of any other timber species. Requirements for close contract supervision to monitor performance and for stipulations in future timber contracts to accomplish pre-harvesting of yew bark.

5. Requirements for Pacific yew sales and harvests in remote or widely scattered areas to have the same strict accountability and monitoring as applied to yew sales and harvests from timber sale contract areas.

6. Instructions for the sale of Pacific yew parts not currently deemed feasible for taxol production. These sales will be for traditional, small scale uses of Pacific yew resources.

7. Instructions and data for establishing fair market value of Pacific yew resources offered for sale.

8. Procedures for issuing and closely supervising Pacific yew harvest contracts.

9. Provisions for protection and maintenance of traditional uses of Pacific yew by Native Americans.

Annual Pacific Yew Program Plan: The Annual Pacific Yew Program Plan (APYPP) is an agreement between Bristol-Myers Squibb Company and the Bureau of Land Management. It commits BLM to executing Pacific yew program elements which include an inventory, conservation and biological guidelines, a programmatic environmental impact statement, research, and sale and administration of Pacific yew. The APYPP commits B-MS to funding the plan elements. Other details of the plan include:

1. Goals for Pacific yew bark harvesting from Federal lands which correspond to the demand identified jointly by the National Cancer Institute and B-MS and resource availability and harvest capabilities identified by BLM.

2. Provisions for releasing parts of the Pacific yew tree, not currently deemed to be feasible sources of taxol, for sale or transfer to other interested parties.

3. BLM projections of budget and staffing needs for executing the Pacific yew program.

4. Commitments to follow all applicable environmental laws, regulations and policies in the sale of Pacific yew.

The current program plan involves BLM in Oregon and Washington only. Future plans are expected to include BLM in Idaho and California as well.

Interim Pacific Yew Conservation and Biological Guidelines: The Forest Service published *An Interim Guide to the Conservation and Management of Pacific Yew* (Interim Guides) in March 1992. This document was developed by specialists representing the Forest Service, Bureau of Land Management, Washington Department of Natural Resources and Oregon State University. These Interim Guides provide direction for conserving and managing Pacific yew populations at the individual tree, stand and landscape levels. They are designed to primarily govern yew harvest outside existing timber sale areas for which environmental analyses have already adequately addressed the impacts of yew harvest (primarily clearcut harvest areas). Such harvest proposals would require site-specific environmental analysis prior to approval for implementation. BLM will implement relevant portions of the Interim Guides until completion of the Pacific Yew Environmental Impact Statement (EIS), after which yew harvests will be governed by provisions and stipulations documented in BLM's Record of Decision. Departures from the Interim Guides will primarily result from differences in geography, land ownership patterns, and authorities between the Forest Service and BLM.

The primary intent of the Interim Guides is to facilitate the harvest of Pacific yew at levels that will maintain viable, genetically diverse yew populations wherever yew occurs. The guides have been designed to maintain options for both yew conservation and taxol production on a long-term basis. Specific conservation objectives for the guide include:

- Maintaining representative viable native populations of Pacific yew.
- Maintaining the ecosystem functions of Pacific yew.
- Prescribing a method of conducting yew harvest that will not impair the viability of yew populations or ecosystem functioning.
- Minimizing undesirable effects resulting from activities associated with the removal of yew plant material.

Recommendations contained in the Interim Guides provide the basis for several alternatives being analyzed in the Pacific Yew EIS.

Pacific Yew Inventory: On August 28, 1992, field work was completed for an intensive inventory of Pacific yew in western Oregon. The goals of the inventory and subsequent data analysis are to determine the characteristics of the Pacific yew population on BLM-administered lands in western Oregon and to provide data for analysis and incorporation, along with Forest Service inventory results, into the Pacific Yew Environmental Impact Statement.

Information has been collected on both the Pacific yew and its habitat. The inventory is attempting to determine the number and location, by diameter class, of Pacific yew trees on BLM lands in western Oregon; the distribution and the vegetative characteristics where Pacific yew is found; the height, diameter, species and condition of trees in the stand; and the number of pieces, tons, and lineal feet per acre of down woody material by species, condition and diameter class. The inventory data are currently being analyzed for use in the Pacific Yew EIS.

In Washington, Idaho, California and eastern Oregon, where yew occurrence on BLM-administered lands is less frequent, Pacific yew is being inventoried through ongoing general forest inventories and by field crews documenting location and stocking information as yew trees are found on a project-by-project basis.

In addition to BLM and Forest Service inventories of lands they administer, USFS Pacific Northwest Research Stations have been monitoring thousands of forest plots outside National Forests and Parks (i.e., primarily private lands and some State and other Federal lands) and documenting yew data from those plots. Prior to 1973, only tree forms of Pacific yew were documented. Starting in 1973, vegetative profiles of all woody plants have been conducted, thus including all forms of Pacific yew. More recently, yew regeneration counts have been added to plot reviews, and occurrence information is being collected outside established plots by research station crews enroute to plots, by some private timber companies, and by interested individuals or organizations. All yew information is being shared by the agencies to assist each in their Pacific yew-related plans and programs.

Pacific Yew Environmental Impact Statement: The Pacific Yew EIS is analyzing a 5-year program to harvest Pacific yew from lands administered by the U.S. Forest Service and BLM. The EIS covers yew-bearing lands in Oregon, Washington, Idaho, Montana, and northern California. The Forest Service is the lead agency for preparation of the EIS, and the BLM and FDA are formal cooperators in its development. Currently, the draft EIS is scheduled to be completed in January 1993, with the final EIS anticipated in June 1993.

Responses from several widely-distributed Pacific Yew EIS scoping newsletters, news releases, meetings with interested groups and individuals, and agency input resulted in the following major issues being addressed in the EIS:

- Analyzing and establishing a suitable and sustainable level of harvest and of taxol production.

- Planting Pacific yew and managing for natural regeneration.
- Protecting and maintaining the genetic diversity of Pacific yew.
- Protecting the ecosystem of which Pacific yew is a part.
- Utilizing all parts of harvested trees.
- Establishing yew collection methods.
- Considering economic effects of yew collection.
- Establishing and defining areas of collection and reserve areas.
- Preventing theft and illegal harvest of yew.
- Developing other sources of taxol.

In response to these issues, the EIS analyzes a range of alternative harvest levels, methods and areas, and considers alternative regeneration levels and sources of taxol.

BLM Resource Management Plans: The Federal Land Policy and Management Act of 1976 requires BLM to periodically inventory the public lands and to prepare land use plans utilizing a systematic, interdisciplinary approach and observing the principles of multiple use and sustained yield. Since these plans address a full range of resource values and uses, they have been called Resource Management Plans (RMPs). Through the interdisciplinary planning approach and required environmental analysis of alternatives, the plans reflect a comprehensive, multi-resource perspective in providing guidance for protection and use of a variety of resources and values within the regions they cover.

Of particular relevance to the current Pacific yew program issues are the six concurrent Western Oregon resource management planning efforts. The RMP/EISs analyze a range of alternative land use management strategies, including alternative forest management scenarios. Some of these alternatives stress management of biological diversity. As a component of this diversity, Pacific yew populations and their ecosystem functions would be maintained, enhanced or reduced under the various alternatives, faring better in those that emphasize biological diversity through reserves or other forest management prescriptions. Specific to the Pacific yew, the RMPs indicate that the strategy for management and collection of yew on Federal lands is the subject of a separate Pacific Yew EIS and that BLM actions covered by the RMPs will be consistent with the final strategy developed through that separate effort.

The final RMPs will incorporate public input from the draft RMP/EIS comment periods. All comment periods will close on December 21, 1992. Final RMPs are expected to be completed in 1993.

Existing Laws, Regulations and Policies: All BLM management actions and programs are administered under authorities of laws, regulations, plans or policies. These authorities provide parameters within which BLM must operate and provide the legal basis for decisionmaking. Any Pacific yew management strategy must fall within these parameters.

Many authorities can generally be related to management of Pacific yew. Some of the more directly applicable laws, regulations and policies include:

- The Federal Land Policy and Management Act of 1976, 43 U.S.C. 1701 *et seq.* FLPMA provides for the management, protection and development of the Public Lands under the principles of multiple use and sustained yield without permanent impairment of the productivity of the land and the quality of the environment.
- The National Environmental Policy Act of 1969, 42 U.S.C. 4321-47. The ultimate goal of NEPA is to improve the quality of the human environment by requiring all Federal agencies to give equal and complete consideration to environmental values in all their decisionmaking. The Council on Environmental Quality (CEQ), established by the Act, promulgated regulations for implementing the procedural provisions of

NEPA (CEQ Regulations at 40 CFR §1500-1508).

- The Pacific Yew Act (signed into law on August 7, 1992) directs the Secretaries of Agriculture and Interior to pursue a policy to provide for the sustainable harvest of Pacific yew, for the manufacture of taxol, and for the long-term conservation of Pacific yew in the wild. The act converts into law many of the elements of the current Pacific Yew Administrative Policies, the Annual Pacific Yew Program Plan, the Interim Guides, Resource Management Plans and the Pacific Yew Inventory. It sets priorities for harvest of Pacific yew, requires pre-harvest of yew bark in timber sale areas and regeneration following yew harvest, mandates completion of the Pacific yew inventory, and encourages research into yew ecology, alternative sources of taxol, and commercial propagation of yew. It authorizes BLM to sell Pacific yew at not less than appraised value to parties manufacturing taxol in the United States and to make unutilized yew materials available to others. The act further requires each Secretary to submit annual reports to Congress regarding sufficiency and sustainability of each year's yew harvest and the results of the Pacific yew inventory.

- The O & C Sustained Yield Management Act of 1937, 43 U.S.C. 1181a, authorizes management of the Revested Oregon and California Railroad and Reconveyed Coos Bay Wagon Road lands for permanent sustained yield forest management.

- Other laws include the Water Quality Act of 1987 amending the Federal Water Pollution Control Act (Clean Water Act) of 1977, 33 U.S.C. 1251 *et seq.*; the Coastal Zone Management Act, 16 U.S.C. 809; the Endangered Species Act of 1973, 16 U.S.C. 809; the Sikes Act of 1960, 16 U.S.C. 670g; the Federal Claims Collection Act of 1966, as amended and supplemented, 30 U.S.C. 185; the Material Sales Act of 1947, as amended, 30 U.S.C. 601 *et seq.*; and the Nonsale Disposals Acts of 1878, 1898 and 1955.

- Other regulations generally applicable to issues concerning the sale, utilization, trespass and pricing of Pacific yew and yew products can be found under Title 43 of the Code of Federal Regulations (43 CFR, Subchapter E -- Forest Management (5000) and Subchapter I, Group 9200 -- Protection).

- Policies related to general forest management, including forest management program development, sale and disposal of forest products, silvicultural practices, forest development, and forest protection and pest management can be found in the 5000 series of the BLM Manual. Policies regarding unauthorized use, trespass, and law enforcement programs are addressed under the 9000 series of the BLM Manual.

Pacific Yew Regeneration Activities: Natural regeneration of Pacific yew occurs from seed germination, stump sprouting, or layering (i.e., stems and branches forming roots when coming in contact with mineral soil). BLM is preparing to grow both seedlings and rooted cuttings (from branches and sprouts) in two of its nurseries, the Charles A. Sprague Seed Orchard near Merlin, Oregon, and the Walter Horning Tree Seed Orchard near Estacada, Oregon, with the objective of replacing yew harvested from timber sales. In addition, BLM is cooperating with the USDA-Forest Service Pacific Northwest Research Station (PNW) in Corvallis, Oregon, and the J. Herbert Stone Nursery near Medford, Oregon, to share research and information about Pacific yew propagation and regeneration. The PNW Research Station studies will quantify the sprouting response of Pacific yew to predict natural regeneration potential and help determine needed outplanting levels.

BLM will be examining the operational feasibility of growing and utilizing rooted cuttings and seedlings to replace Pacific yew where its numbers have been reduced. On one site in particular in Idaho, BLM is conducting surveys to determine moose winter use in a 15-acre parcel from which yew was illegally removed. While gathering information regarding moose, BLM will also evaluate stump sprouting success for regeneration of yew and planting of rooted cuttings if necessary to promote reestablishment of yew.

BLM also hopes to diversify existing plant communities by planting Pacific yew in those plant series where it has been known to historically occur, but is currently absent or low in numbers.

Population Viability Modeling: The PNW Research Station-Corvallis, Oregon, is developing a conceptual and mathematical model of the Pacific yew population. This type of model will enable managers to assess the potential effects of different levels of yew harvest on the viability of the yew population. The model would facilitate analysis of strategies to conserve the species while providing yew products. Conservation strategies that could be developed or refined include genetic reserves, artificial regeneration, and maximum annual harvest levels under various management objectives.

Participation by BLM in the development of the model, by providing information needed for its development or financial support, would ensure timely utilization of the model for efficient management and conservation of the yew. Participation would also ensure that the model design will include parameters applicable to the characteristics of BLM-administered forest lands, such as their fractured ownership patterns and relatively lower elevations. Information needed to develop the model includes mortality rates, growth rates, reproductive rates, habitat distribution, and rate of habitat loss.

Continuing Pacific Yew Research Programs: BLM is a cooperator with both the Forest Service and the Pacific Northwest Research Station (PNW) in studies pertaining to the Pacific yew. The Bureau has been asked to review research proposals by PNW and comment on their feasibility. A site has been identified on BLM's Medford District as a candidate for a PNW stump sprouting study.

Yew research programs by PNW constitute an overall 4-year study on the conservation biology of the species. Research areas include population structure and reproduction mechanisms, effects of harvesting practices on yew growth and regeneration, population dynamics, and environmental and stand factors that influence yew growth across diverse landscapes of the Pacific Northwest.

The data collected as part of the Pacific Yew Inventory is being analyzed to provide insight into population distribution and dynamics, ecosystem implications for Pacific yew management activities, and potential strategies for integrating Pacific yew objectives into land use plans. Work has begun in tracking Pacific yew survival and regeneration in harvest units as well as cultivation activities in BLM nurseries and seed orchards.

Pacific Yew Conference: A conference entitled, *Pacific Yew: A Resource for Cancer Treatment*, was held at Oregon State University in Corvallis, Oregon on August 3 - 5, 1992. Co-sponsors included USDI, Bureau of Land Management; USDA, Forest Service Region 6; USDA, Forest Service Pacific Northwest Research Station; Oregon State University College of Forestry; and the National Cancer Institute. This conference provided a forum for information sharing and dialogue regarding research, management, conservation, and social issues concerning Pacific yew, taxol production, and the potential for treating cancer. The conference was well attended by the public. It included both general and technical sessions designed to increase understanding of the issues and promote interaction among participants of diverse backgrounds. Agenda topics included:

- The relationship between people, medicine, and natural resources
- Managing natural resources for human benefit
- Yew biology and research
- Medical and pharmaceutical advances
- Resource conservation and sustainability
- Management practices
- Administration and legal aspects
- Achieving common goals

- Integrating resource management and research

- Ethics and the resource

New information gained at the conference is being incorporated into agencies' Pacific yew programs and policies.

Regeneration Stocking Surveys: The stated objective of regeneration stocking surveys under BLM Manual 5705.02 is "to determine (the) adequacy of stocking, interfering conditions, treatment needs, and the presence of nonproductive land within the survey area."

Currently, the BLM conducts regeneration stocking surveys on harvest units at various intervals, including prior to and following any reforestation treatment or following a regeneration cut. Only suitable trees are presently tallied as applying toward meeting appropriate stocking standards. The Pacific Yew Administrative Policies include requirements to conduct regeneration stocking surveys of Pacific yew. These surveys could not only quantitatively identify residual, naturally regenerating, and planted Pacific yew within harvest units, but also could collect analytical information for evaluating the effectiveness of current Pacific yew management techniques.

Port-Orford-Cedar Management Plan: Port-Orford-cedar (*Chamaecyparis lawsoniana*) is a minor but valuable component of the forests of southwest Oregon. It is currently undergoing attack by the fatal fungal pathogen Port-Orford-cedar root rot (*Phytophthora lateralis*) in the northern part of its range. Two national forests in southern Oregon and northern California have documented mortality in Pacific yew due to the root rot in a relatively small area where the yew occurs with Port-Orford-cedar. A comprehensive Port-Orford-Cedar Management Plan has been adopted in BLM's Medford District. It is being reviewed by the Oregon State Office for statewide adoption. This plan is based on the Forest Service Action Plan for Port-Orford-Cedar and has been reviewed by the Forest Service. By managing the impacts to the forest environments where both these species occur, the disease can be managed as well.

III. Pacific Yew Management Issues

Issues Mailer and Draft Strategy

A Pacific Yew Issues Mailer was distributed to over 3,000 individuals and organizations in March 1992 to solicit comments on a list of draft issues and any recommendations for additional issues that a Pacific yew strategy document should address. Several hundred responses specifically addressed the listed issues or suggested additional issues to be considered. Most comments provided information or concerns relative to a particular issue that influenced the description and analysis of that issue. The Draft Pacific Yew Comprehensive Management Strategy, which incorporated a great deal of input resulting from the issues mailer, was distributed to over 1,800 individuals and organizations in June 1992. Few comments were received on the draft document.

Some responses to the issues mailer and to the draft strategy document addressed issues outside the scope of the strategy, as interpreted from the language in the Appropriations Act. Several gave specific suggestions about how Pacific yew should be managed, such as protecting all yew in anticipation of synthetic taxol, intensively harvesting yew to meet current medical needs, and even various methods of harvest, including horse and mule logging. This information was provided to the individuals or teams responsible for ongoing programs that are addressing these issues (e.g., the Pacific Yew EIS Team). Other comments dealt with management of yew on private lands where BLM has no yew management authority.

Another issue involved how Pacific yew would be managed after it is no longer needed for taxol production. This issue goes beyond the stated purpose of the strategy (i.e., to ensure a sustainable supply of Pacific yew to the medical community). However, with the increasing knowledge of the species and its role in the ecosystem, Pacific yew would likely continue to receive attention in plans and environmental analyses at a level beyond the current emphasis on general components of biodiversity. A few comments questioned future management of other "special forest products" following the lesson learned about valuing Pacific yew. Management of these other species is now being addressed in land use plans with respect to their role as components of biodiversity.

Revisions to the Pacific Yew Strategy between the draft and this final document primarily involve clarification of some issues and updates on the various Pacific yew programs that address the issues.

Strategy Document Issues

This section explains the issues pertinent to Pacific yew management using the four issue categories, initially identified in the Issues Mailer, as the basis for primary objectives that would meet the stated goals of Congress. Each issue is described as a need for consideration as part of the overall strategy. This description is followed by a discussion of the programs under which that issue is being addressed and any recommendations for additional study, analysis, or planning efforts needed to adequately resolve that issue. The Issues/Programs table at the end of this document portrays the relationship between the various issues and the current and planned programs under which the issues are being addressed.

As a reminder, this strategy document does not in itself resolve the many issues pertinent to use and protection of Pacific yew. It is specifically designed to avoid duplication of the various ongoing efforts established to address Pacific yew management. As such, this document identifies those mechanisms through which the stated goal of Congress will be fulfilled.

Overall Goal of the BLM's Pacific Yew Strategy: *The overall goal established by Congress in the 1992 Interior Department Appropriations Act is for BLM to ensure "a sustainable supply of Pacific yew for the medical community with the least impact to the environment and to the Pacific yew resource."*

Resource Objective #1: *To ensure a sustainable yew supply to the medical community.*

A. Need to Consider: Sustainable harvest levels under an even flow (i.e., consistent annual harvest level) or a departure from even flow harvest program.

Background: Harvesting yew on an even flow basis assumes a long-term need, while harvesting at a high level in the short term to meet immediate needs assumes that taxol from other sources (e.g., from needles or from synthetic production) will be available before yew sustainability is threatened. Allowable harvest targets will need to be established consistent with these critical threshold levels. To do so requires that essential data about yew abundance, distribution, growth rate, regeneration, and harvest levels be acquired to ensure that yew can be perpetuated in the ecosystem and provide a harvestable supply of taxol. With commercial species, this task is generally accomplished through a sustained yield harvest model designed to include specific parameters of the species of concern and local habitat productivity. Such a model uses inventory, research and monitoring data to predict how much of the species can be harvested and regenerated for a given habitat condition over time.

Past/Current/Planned Activities: Some information about yew abundance, distribution, age structure, harvest levels and regeneration has resulted from past, isolated field exams (e.g., stand exams, extensive forest inventory, interdisciplinary team reports and botanical exams), but the data collected has not been standardized nor are the samples complete. Districts have surveyed all proposed timber sales, sold sales still uncut, and units cut within the last 18 months to locate, map, mark and tabulate yew by diameter. Yew provided to the B-MS Company's designated agent, Hauser Northwest, are tabulated as a record of harvest level. Hauser is maintaining yield data for yew collected. Preliminary results are highly variable, indicating that more data will need to be collected. Continued monitoring will lead to detailed information that can be used in predictive harvest models.

The intensive Pacific yew inventory, completed in August 1992, sampled all forested areas on BLM-administered lands in western Oregon for data to be used in harvest and yew viability modeling and, in combination with Forest Service inventory data, for the Pacific Yew EIS.

The Pacific Yew EIS is considering various harvest regime alternatives with the assumption that alternative sources of taxol will become available within five years. At least one EIS alternative, though, is based on the *Interim Guide to the Conservation and Management of Pacific Yew*, which assumes that demand for yew products may persist or even increase over the long term.

The Interim Guide considered the likelihood of alternative sources of taxol becoming available in the next few years. However, it was designed to take a conservative approach to maintain options for both yew conservation and taxol production on a long-term basis.

B. Need to Consider: Prioritization of harvest areas.

Background: To ensure a sustainable yew supply, decisions need to be made regarding where and when to harvest yew most efficiently, effectively and economically while ensuring that the yew itself, its other values, and its habitat components are neither unnecessarily impacted nor depleted. In the past, no effort was made to specifically seek out or avoid Pacific yew in harvest regimes, nor were impacts of commercial timber harvest and site-preparation activities monitored specific to impacts on yew.

Past/Current/Planned Activities: The Pacific Yew Inventory gathered data on yew populations and habitat that is being utilized in the development and analysis of alternative yew harvest priorities, from areas of no harvest to intensive harvest, in the Pacific Yew EIS. The Interim Guides provide recommendations for determining harvest priorities based on the overriding principle that the preservation of existing yew population characteristics has a higher priority than short-term taxol production. A number of recommendations in these guides have been incorporated into several of the alternatives in the EIS. The ultimate yew harvest priority decisions will be made after careful consideration of the analysis and conclusions in the Pacific Yew EIS.

In the interim, the Administrative Policies and more recently, the Pacific Yew Act, provide instructions for prioritizing the harvest of Pacific yew.

In Oregon and Washington, yew harvest has been directed to existing timber sales and those approved for harvest through the environmental analysis and biological assessment processes. The only yew harvested outside timber sale areas are dead trees. Such yew are harvested to ensure that any remaining taxol can be recovered. The policies and the Pacific Yew Act direct field managers to pre-harvest yew from timber sale areas prior to the harvest of any other timber species to maximize taxol recovery.

C. Need to Consider: How taxol from yew parts other than bark or from synthetic production might affect demand and sustainable supply levels.

Background: Currently, taxol is derived almost exclusively from yew tree bark. The bark of the Pacific yew is the only taxol source approved for use in humans by the Food and Drug Administration. Production of taxol involves drying and grinding of yew bark, solvent extraction, isolation, purification and formulation. Although extraction and testing of taxol are progressing rapidly, the drug is difficult to isolate, extract and prepare in large quantities.

The encouraging results of clinical testing will be of little value if large quantities of taxol cannot be produced on a long-term basis. In anticipation of potential licensing of taxol early in 1993 by FDA for use in treating ovarian cancer, the harvest target established for yew bark from BLM and Forest Service lands during fiscal year 1993 amounts to approximately 750,000 pounds, dry weight. This target roughly translates to over 100,000 trees of average harvestable size. Yew harvesting at this rate would substantially reduce the population of large old yew trees if sustained for more than a few years.

Non-bark sources of taxol must be developed to supply the thousands of cancer patients needing treatment every year. Taxol may come from several sources (e.g., bark, needles, wood, tissue culture, other yew species such as *Taxus baccata*, a European yew, or partial or full synthesis) as future technological advances are developed and expanded to accommodate commercial drug production. Although progress is being made on all fronts, none, except Pacific yew bark, have reached the point of approval by FDA. Any successful taxol source from non-bark parts of the yew tree would increase supply, but only those methods involving renewable parts of Pacific yew (e.g., needles or tissue culture) or utilizing other yew species would significantly influence impacts on the Pacific yew itself.

For sources involving Pacific yew, studies have shown that taxol concentration varies greatly between different parts of the yew and also can vary from one Pacific yew to another. Analyses indicate that the bark contains the greatest taxol concentrations compared to other yew parts. A recent analysis presented at the Pacific Yew Conference showed an average taxol concentration by weight percent in bark being ten times greater than in yew needles and 200 times greater than in the bole wood.

With respect to synthetic production of taxol, the development of an economical and safe (i.e., a variety of toxic chemicals can be involved) process would reduce and possibly eliminate the demand for Pacific yew as a source for taxol.

Past/Current/Planned Activities: Some assumptions have been developed relative to alternative sources of taxol and their potential to affect demand and sustainable supply levels of Pacific yew. These assumptions were used to assist in preparation of the Interim Guides and for analysis purposes in the Pacific Yew EIS effort.

In the Interim Guides, it is assumed that the use of wild populations of Pacific yew for taxol production can be expected to continue for only three to five years, but the demand for yew products may persist and even increase. Under this assumption, the guidelines were designed to maintain options for both yew conservation and taxol production on a long-term basis.

The Pacific Yew EIS addresses the potential for reduced demand on the yew tree for taxol production due to alternative sources becoming available in the short term (about five years), both in the development of alternatives and as an analytical assumption to assist impact analysis.

D. Need to Consider: How demand, processing capability and harvest levels interrelate.

Background: Although demand for Pacific yew as a source of taxol is high, there is concern that processing capabilities do not match that demand and that harvest levels should be adjusted accordingly. Any harvest levels that exceed processing capabilities within the period that taxol remains viable would result in waste of resources.

Past/Current/Planned Activities: Taxol processing efficiencies and capabilities have increased as a result of technology advances and the development of additional processing facilities. The Annual Pacific Yew Program Plan sets goals for yew bark harvesting from Federal lands which correspond to demand identified jointly by NCI and B-MS and resource availability and harvest capabilities identified by BLM. Demand is primarily based on estimated processing capability.

The Pacific Yew EIS analyzes the environmental impacts of alternative yew harvest levels, methods and areas. To do so required an analytical assumption regarding demand for Pacific yew and associated processing capabilities. For harvest analysis purposes, the EIS assumes that all yew harvested would be capable of being processed for taxol production, with the caveat that any proposed levels exceeding processing capabilities would be reduced to avoid waste of the yew resource.

E. Need to Consider: Regeneration options that are viable, and the advantages and disadvantages of increasing yew reproduction.

Background: Any program of Pacific yew harvest must consider how the yew can be feasibly and effectively replaced in the ecosystem. In addition, options need to be considered regarding whether to merely replace harvested yew, to regenerate populations to some historically higher levels, to return yew to habitats where it historically occurred but is currently absent, or to increase yew populations beyond historical levels. Additionally, potential effects of dispersing yew throughout its range with respect to genetic variability must be considered.

Past/Current/Planned Activities: BLM's Pacific yew regeneration activities are described in detail in the previous section on Current and Planned Pacific Yew Programs. Regeneration stocking surveys and research activities are also described under those headings in the previous section.

The Pacific Yew EIS will consider alternative regeneration levels as described in the background section above.

The effects of yew regeneration on genetic variability are discussed under Resource Objective # 2, Issue C, which deals with maintaining genetic diversity.

Resource Objective # 2: To ensure full consideration of ecosystem relationships in Pacific yew management plans and decisions.

A. Need to Consider: Inventory, demographics, reproduction and existing and historic range of Pacific yew.

Background: A valid analysis of Pacific yew's ecosystem relationships must start with data regarding yew numbers, demographics (e.g., age classes, size, affiliation with other plant and animal species), reproduction, and present and historic areas of occurrence.

Past/Current/Planned Activities: As part of its routine inventory process, BLM gained preliminary figures on Pacific yew populations and distribution on some public lands under its administration. The Pacific Yew Inventory gathered extensive data on yew numbers, distribution and demographics. Habitat requirements and historical records are being combined to give an indication of historical range of yew. A forest history study conducted at Marion Lake in southwestern British Columbia by the Forest Science Research Branch of the B.C. Ministry of Forests suggests that despite the rare occurrence of Pacific yew today, it may have been an important component of the forest prior to the increased abundance of western redcedar (6,500 to 5,400 years before present).

Yew reproduction is receiving a great deal of attention in ongoing BLM and USFS regeneration activities and several research programs described earlier. The Interim Guides considered what is and is not yet known about yew demographics and reproduction in establishing conservative guidelines for yew harvest prior to completion of the Pacific Yew EIS. The EIS applies these guidelines and some modifications of them in several alternative harvest scenarios and will incorporate inventory and research data, as it is developed, to complete the environmental analysis process.

B. Need to Consider: The role of Pacific yew in the ecosystem.

Background: A better understanding of the role of Pacific yew in the ecosystem is needed to adequately address the impacts of yew harvesting on the ecosystem. This impact information is essential to informed decisionmaking. Currently, the role of Pacific yew in the ecosystem is best understood from a wildlife perspective. Yew provides thermal cover and food for wildlife, but little is known about the importance of yew in nutrient cycling, modification of microclimate, and maintenance of specialized mycorrhizae and foliar invertebrates. Given its slow decomposition rate and unique biochemistry, yew may possibly play a special role in cycling nutrients, altering soil chemistry, or contributing to the biological diversity of the soil and canopy.

Past/Current/Planned Activities: Most information gained on yew ecosystem functions has centered on wildlife and riparian relationships. This information was utilized in the development of the Interim Guides, which seek to preserve ecosystem functions through genetic reserves, conservative harvest prescriptions, and artificial regeneration. The Pacific Yew EIS uses these guidelines as a basis for several alternatives and is addressing impacts to ecosystems from alternative harvest scenarios.

The Western Oregon Resource Management Plans are considering some alternatives that stress management of biological diversity, and their associated EISs analyze the impacts of each alternative on biological diversity. As a component of biological diversity, Pacific yew populations and their ecosystem functions would be indirectly addressed by the plans.

Some ongoing research activities will provide insight into ecosystem implications for Pacific yew management activities. The need for additional research into yew ecosystem functions is addressed under the Research and Monitoring section of the Interim Guides.

C. Need to Consider: Maintaining viable yew populations and genetic diversity.

Background: The preservation of existing yew population characteristics would ensure sustainable supplies of yew and provide for future developments in biotechnology by preserving the raw materials and gene pools that may be needed. It will also maintain yew in the ecosystem. Genetic variability within the species can result in unexpected effects from regeneration programs, and such variability can be lost if not well understood and accounted for in regeneration programs.

Past/Current/Planned Activities: Population viability modeling by the USDA-Forest Service PNW Research Station, located in Corvallis, Oregon, will enable assessment of the potential effects of different levels of yew harvest on the viability of the yew population. The results can be used to update the Interim Guides and to assist the Pacific Yew EIS effort. Until the model is developed, the Interim Guides have adopted a conservative approach to management of yew that places preservation of existing yew population characteristics as a higher priority than short-term taxol production.

Ongoing research by PNW includes one study that indicates there is significant genetic variation within and among yew populations for height, number of growing points, and bud set. However, two isozyme studies examining genetic variation in Pacific yew indicate that Pacific yew may have moderate levels of genetic variation comparable to species which grow in restricted environments, such as Monterey, Knobcone, and Bishop pines. Other studies are looking at variations in taxol production in Pacific yew. The results of these studies will be incorporated into ongoing yew management programs, including regeneration programs which, under the current conservation guidelines, require that only natural regeneration or genotypes of local origin can be used for reforestation.

Recommended Actions: It is recommended that BLM cooperate in and have access to the results of the population viability modeling efforts being conducted primarily by the PNW Research Station in Corvallis, Oregon. Participation and access by BLM will ensure that data reflect the needs and conditions specific to BLM-managed lands and that BLM's yew management programs will benefit from the latest scientific information available regarding Pacific yew biology and ecosystem functions.

D. Need to Consider: Effects on and from other plants and animals via yew management.

Background: Various management practices will affect Pacific yew differently based on the species' needs and characteristics and the degree of habitat modification. In addition, yew management can result in effects on other components of the surrounding ecosystem, both in terms of direct disturbance and indirect effects from ecosystem relationships. Yew management programs can affect the yew's vulnerability to damage from other plant and animal species, such as Port-Orford-cedar root rot exposure and browsing by ungulates (e.g., moose).

Past/Current/Planned Activities: The Pacific Yew EIS is designed to specifically address impacts caused by yew management activities. Impacts and conclusions documented in the EIS will receive full consideration in making final Pacific yew program decisions. Specific yew management proposals will be analyzed for site-specific environmental impacts through environmental assessments (EAs) tiered to the Pacific Yew EIS. In the meantime, the Interim Guides have considered what is known about yew management impacts in establishing conservative directions for maintaining viable yew populations, genetic variability and ecosystem relationships.

The Port-Orford-Cedar Management Plan, developed by BLM's Medford District, addresses Port-Orford-cedar root rot infection of some Pacific yew populations. The plan provides guidance for preventing actions that would expose Pacific yew to spread of the disease. The Pacific Yew Inventory in the Medford District, where the disease has been found, specifically looked for evidence of infection within plots. No such infection has yet been found in Pacific yew on BLM-administered lands.

E. Need to Consider: Cumulative effects of yew management activities with other management activities on adjacent and intermingled lands.

Background: BLM-administered lands adjoin a variety of jurisdictions and ownerships, including other Federal, State and local agency-administered lands and private lands. In western Oregon in particular, BLM-administered lands are highly fragmented, often showing a "checkerboard" land ownership pattern of alternate sections of BLM and primarily private lands. Other blocks of BLM-managed lands often surround intermingled private inholdings. Yew management activities on BLM lands could have cumulative effects on a particular area (e.g., a watershed, region or any area where a combination of past, present and future actions would have potentially significant cumulative impacts) when considered in combination with resource management activities on adjoining and intermingled lands. Consideration of potential cumulative impacts of yew management proposals in combination with activities occurring or likely to occur on adjoining and nearby lands is essential to informed decisionmaking.

Past/Current/Planned Activities: The Pacific Yew EIS is analyzing the environmental consequences, including the cumulative effects, of a 5-year program of yew harvest and other management on lands administered by USFS and BLM. To do so requires consideration of existing, planned or likely activities on adjoining and nearby lands. EISs being developed for the western Oregon RMPs also consider cumulative impacts of management proposals with existing and likely activities on other ownerships within the area of influence.

The Interim Guides considered the potential cumulative impacts of Pacific yew harvest, within all ownerships, on the yew in particular in developing conservative guidance designed to ensure maintenance of yew population characteristics.

Support Objective # 1: To effectively administer a Pacific yew program that adequately addresses the issues of yew supply, ecosystem relationships and values.

A. Need to Consider: Ways to eliminate or significantly reduce unauthorized yew removal or damage.

Background: There are an estimated 10.5 million Pacific yew trees on BLM-administered lands in western Oregon and Washington, of which 1.75 million are considered to be of harvestable size (i.e., 2 inches or greater in diameter). The current BLM policy regarding the sale of yew requires that it only be sold in approved sale units to collectors who qualify as agents for B-MS and Hauser Northwest.

Investigation identified a high incidence of theft of Pacific yew in western Oregon in 1991. Although a limited resource, considerable amounts of yew bark have been removed without authorization and then sold and often exported. Due to its high portability and commercial value, yew theft is expected to continue.

Past/Current/Planned Activities: A variety of laws and regulations address the issues of management and protection of public lands and resources, forest management, and theft of Federal land resources. The Pacific Yew Administrative Policies have established specific procedures for strict accountability and monitoring of all Pacific yew harvesting and transportation to minimize the opportunities for unauthorized use and theft of Pacific yew resources. Also included are requirements for protection of sensitive information relating to yew locations. The Pacific Yew EIS is addressing additional means to stop theft and illegal harvest of yew.

Law enforcement staffs in BLM and USFS are engaging in cooperative efforts to carry out the monitoring and enforcement provisions of the Administrative Policies and in investigation and prosecution of individuals involved with Pacific yew theft from Federal lands in the Pacific Northwest. The incidence of yew theft in 1992 has declined dramatically, largely as a result of the new accountability procedures in the Pacific Yew Administrative Policies.

Operation SAVE has been instituted to enable visitors to assist law enforcement efforts and protect public land resources by reporting observed violations, including yew theft. Reports can be made by calling 1-800-333-SAVE (7283).

B. Need to Consider: Potential sensitivity of yew location information.

Background: The increased demand and substantial commercial value of Pacific yew has resulted in yew thefts from public lands. Publicly disclosing specific locations of yew concentrations found on public lands can lead to increased incidence of theft and associated damage to other resources.

Past/Current/Planned Activities: The Pacific Yew Inventory has ascertained yew locations and population and habitat characteristics on public lands. The Pacific Yew Administrative Policies include requirements for protection of that portion of the database involving sensitive information on specific yew locations. Such information has been classified as non-public for purposes of theft abatement. Under these guidelines, information on specific locations of Pacific yew is not releasable and will not be published in BLM documents.

C. Need to Consider: Administering yew sales and harvests in association with timber sales or as a separate activity.

Background: Before 1989, Pacific yew was routinely sold as a miscellaneous forest product, independent of advertised timber sales, using negotiated cash sale contracts. In 1989, BLM's policy for Oregon and Washington changed to allow harvesting of Pacific yew only in active timber sale contracts, with the exception of dead trees in areas outside active sale units. As demand for yew products increases, harvest proposals in Oregon and Washington will eventually need to be considered outside approved timber sale areas, as is the case in Idaho and California, using specific standards for analysis and approval of these proposals.

Past/Current/Planned Activities: The Pacific Yew Administrative Policies provide instructions for prioritizing the harvest of Pacific yew and requirements for strict administration of yew sales and harvests both within and outside existing timber sale contract areas. In addition, the Interim Guides provide parameters for yew harvest levels and areas both within and outside existing timber sale areas.

Prior to completion of the Pacific Yew EIS and Record of Decision, any yew sales and harvests considered separately from the timber sale process would be analyzed and administered in conformance with the Administrative Policies and the intent of the Interim Guides and would require site-specific environmental analysis prior to implementation. BLM's Record of Decision, which will follow completion of the Pacific Yew EIS, will guide administration of yew sales and harvests on all lands administered by BLM.

D. Need to Consider: Procedures for administering yew sales and harvests where yew trees are widely dispersed or in remote areas.

Background: Where yew trees are widely dispersed or in remote areas, sale administration becomes more difficult and harvests become less efficient and economical. Such factors influence the level of diligence applied to utilization standards and overall sale administration. However, to meet the goal of supplying taxol with the least impact to the environment and to the yew resource requires that any useable yew in an approved timber sale area and all harvested yew trees be utilized to the maximum extent possible.

Past/Current/Planned Activities: The Pacific Yew Administrative Policies require that yew sales and harvests in remote or widely scattered areas have the same strict accountability and monitoring as applied to yew sales and harvests from timber sale contract areas. The Pacific Yew Act requires BLM to pre-harvest Pacific yew in existing timber contracts, regardless of whether the yew is concentrated or widely scattered throughout the sale area.

The Interim Guides include guidance for determining whether to harvest yew in specific areas based on yew population and density factors.

The Pacific Yew EIS is analyzing alternative yew harvest levels and harvest priority areas to assist in final decisionmaking regarding yew harvest locations, volume, and appropriate design features.

E. Need to Consider: Utilizing parts of the yew tree, not currently deemed to be feasible sources for taxol production, for other purposes.

Background: Native Americans and other local residents have utilized yew wood for specialty products, such as bows, musical instruments and fence posts. Demand for these specialty products still exists. Provisions are necessary to allow continued use of yew for these purposes, while also providing yew parts for continued taxol production.

Past/Current/Planned Activities: Only the bark of Pacific yew is currently approved for taxol production. Current regulations allow for the sale and use of yew wood and other parts as miscellaneous forest products. The Annual Pacific Yew Program Plans include provisions for releasing parts of the yew tree, not currently deemed to be feasible sources of taxol, for sale or transfer to other interested parties. Similarly, the Pacific Yew Act authorizes BLM to make unutilized yew materials available to others. The Pacific Yew Administrative Policies include specific provisions for protection and maintenance of traditional uses of Pacific yew by Native Americans.

F. Need to Consider: Determining budget and staffing needs for the yew program.

Background: Effective implementation of a Pacific yew management program requires commitment of budget and staff. In the past, yew sales were sporadic and administration was included as part of a miscellaneous forest products program with no special emphasis on yew. Budgeting was accomplished as part of the overall forest management program. The current high demand for Pacific yew and level of concern for the potential effects of intensive yew harvest have elevated yew management to a program level requiring specific budget and staffing attention. This program emphasis has resulted in the assignment of collateral yew planning, management and coordination duties to existing positions at each level of the BLM organization.

Past/Current/Planned Activities: The Annual Pacific Yew Program Plan commits B-MS to fund the Pacific Yew program elements during this current stage of medical testing. BLM budget directives require field managers to project annual budget and staffing needs. These projections are then included in the Annual Pacific Yew Program Plans.

G. Need to Consider: Determining yew sale prices.

Background: Historically, yew products were classified as miscellaneous forest products and prices were established in accordance with BLM Manual 9350 (Forest Products Appraisal). Currently, however, yew's commodity value has greatly increased with its demand for taxol production. Pacific yew sale prices must be calculated to reflect fair market value in accordance with regulations governing sales of forest products (43 CFR 5400).

Past/Current/Planned Activities: The Pacific Yew Administrative Policies provide instructions and data for determining the fair market value of Pacific yew resources offered for sale. The Pacific Yew Act requires BLM to sell Pacific yew "at not less than appraised value."

H. Need to Consider: The relationship of the yew program to other laws, regulations, plans, policies and programs.

Background: All BLM programs or activities must operate within the parameters of established laws, regulations, plans, policies and any program-specific guidance. Whenever programs are being developed or activities are being proposed, conformance with this hierarchy of guidance is examined and verified and any conflicts between programs must be resolved.

Past/Current/Planned Activities: Some of the primary laws, regulations and policies influencing the Pacific yew program are highlighted in Section II. The Pacific Yew Administrative Policies were developed within the parameters of existing laws, regulations, plans, policies and programs, and the Annual Pacific Yew Program Plan includes commitments to follow all pertinent laws, regulations and policies in the sale of yew.

The Pacific Yew EIS is addressing impacts of a yew harvest program on other resources and ongoing programs. The western Oregon RMPs are considering a range of resource use and protection options in determining the most appropriate mix to ensure sustained production of resources and values on the public lands. The RMPs stipulate that BLM actions will be consistent with the final strategy developed through the Pacific Yew EIS effort. Ultimately, both efforts will establish new plans and policies under which the Pacific yew and other programs will operate.

I. Need to Consider: Keeping up with and incorporating evolving knowledge and technology.

Background: Techniques for yew harvest, taxol extraction from various yew plant parts, regeneration, and taxol synthesis are rapidly evolving and expanding, along with knowledge of yew biology and ecosystem relationships. With each new breakthrough, assumptions and analysis guidelines upon which BLM programs are based need to be reviewed for continued relevancy, and programs need to be updated.

Past/Current/Planned Activities: Pacific yew coordinators and other resource specialists are keeping informed about advances in technology and knowledge through review of relevant journals and research publications and attendance at pertinent meetings and workshops, such as those sponsored by the Native Yew Conservation Council and NCI. BLM has completed an intensive yew inventory and will study and monitor yew regeneration throughout western Oregon and other selected areas in the yew's range. BLM is also cooperating with the Forest Service and their PNW Research Station in Corvallis, Oregon, to gain information and data on yew regeneration, population viability modeling, and other research on yew biology, population dynamics and ecosystem relationships.

The Pacific Yew EIS and the Interim Guides are designed to consider and incorporate new information as it becomes available through inventory, research and breakthroughs in technology.

The Pacific Yew Conference, which was held at Oregon State University in August 1992, provided a forum for information sharing and dialogue regarding research, management, conservation and social issues concerning Pacific yew, taxol production, and the potential for treating cancer. Information gained at the conference has been incorporated into ongoing Pacific yew programs. For example, the U.S. Forest Products Laboratory in Madison, Wisconsin, reported that the problems associated with extraction of taxol from yew heartwood are not likely to be resolved before development of alternative sources of taxol. This report and the study results presented regarding relative taxol concentrations in yew bark, needles and bole wood have resulted in BLM rescinding its instructions to reserve the bole wood for potential taxol production following yew sales.

J. Need to Consider: Preparing, issuing, and monitoring compliance with permits and contracts.

Background: Past administration of yew sales was included with other miscellaneous forest products, with no special emphasis on yew. Pacific yew's substantial increase in value as a source of taxol has resulted in high demand for its bark and a high level of concern over where, how and at what level it should be harvested. Although existing laws and regulations provide guidance for permitting and contracting, special procedures specific to yew have become necessary, and compliance with stipulations in the permits and contracts requires careful monitoring.

Past/Current/Planned Activities: The Pacific Yew Administrative Policies identify procedures for issuing and closely supervising yew harvest contracts and provide specific yew harvest stipulations to be included in contracts. The Interim Guides also provide guidance to be used as the basis for contracts and permits. The Pacific Yew EIS, which is considering the Interim Guidelines through several alternatives, will ultimately assist decisionmakers in establishing guidance and stipulations to be applied to future permits and contracts. Site-specific environmental analyses, tiered to the Pacific Yew EIS, will consider additional mitigation that could be adopted for specific harvest proposals and subsequently used in contracts or permits.

K. Need to Consider: Designing and administering yew management activities to minimize conflicts and maximize compatibility with other resources.

Background: Pacific yew management activities can often be designed to minimize resource conflicts or maximize compatibility with other resources. Opportunities to design such activities must be explored and, where feasible, adopted to avoid unnecessary and undue degradation of other resource values.

Past/Current/Planned Activities: The Interim Guides prescribe methods of conducting yew harvests that will not impair ecosystem functioning and that minimize undesirable effects resulting from activities associated with the removal of plant material. The Pacific Yew EIS is analyzing these methods as well as alternative management techniques to assess their impacts on the ecosystem of which Pacific yew is a part. Yew management decisions following completion of the EIS will be required to prevent unnecessary and undue degradation of resources on public lands.

L. Need to Consider: Cultural and traditional values of Pacific yew.

Background: Physical use of Pacific yew for other than the production of taxol has been addressed under Support Issue # 1.E. However, Pacific yew also possesses non-commodity values, such as intrinsic, aesthetic and spiritual values. Such values are often overlooked, and they are more difficult to account for, but not impossible to address, in natural resource management programs.

Past/Current/Planned Activities: Provisions for the maintenance of traditional uses of Pacific yew by Native Americans are included in the Pacific Yew Administrative Policies. The Pacific Yew EIS will include sections on Cultural Resources that will deal with both traditional associations and uses as well as modern uses of Pacific yew. The western Oregon RMPs and their associated EISs will also address cultural resources. Aesthetic values will be considered by both efforts in terms of visual quality. Intrinsic, aesthetic and spiritual values will also be indirectly protected through special protection areas, such as genetic reserves, research natural areas, wilderness areas and designated northern spotted owl habitat areas, established or recommended through these and other efforts.

Support Objective # 2: *To provide appropriate public education, information and coordination to ensure adequate attention to the issues of yew supply, ecosystem relationships and values.*

A. Need to Consider: The level and types of public involvement that would most effectively support development and administration of yew management plans and activities.

Background: The Pacific yew/taxol issue is highly sensitive and significantly affects a broad range of people. Interests and values vary through the spectrum from intrinsic to utilitarian, concentrating around the species/ecosystem and medical/life-saving viewpoints.

People who are interested or affected by management of this public land resource deserve full public disclosure about any planning processes or management proposals that would affect Pacific yew and its habitat. In addition, public involvement in any planning process or during consideration of any proposal can greatly assist those efforts through the sharing of information and creative ideas for development of management programs or resolution of conflicts. With the assistance of public input, decisionmakers are better informed. Any resulting yew management plans or activities reflect a greater diversity of perspectives and hold a better chance to successfully accomplish agreed upon goals.

Past/Current/Planned Activities: The approach used to inform and involve the public in this strategy planning effort was designed to reach the broadest possible audience with a potential interest in the subject. The mailing list compiled for distribution of the Pacific Yew Issues Mailer incorporated the joint Forest Service/BLM/FDA Pacific Yew EIS mailing list, which itself was the product of a wide variety of USFS and BLM mailing lists and responses to various news releases and newsletters. In addition, the BLM mailer was individually mailed to potentially interested parties by each BLM office within the affected area and was the subject of newsletter articles and news releases. Over 3,000 mailers were distributed as a result of these outreach efforts.

The draft Pacific yew strategy document was distributed to over 1,800 individuals and organizations for review and comment. A stated purpose of this strategy document is to describe and show interrelationships between the various efforts to inventory, study and manage Pacific yew on public lands, as well as to solicit public input in planning and implementing these efforts. As such, this document is a primary vehicle for public information and involvement in development and administration of yew management plans and activities.

The Pacific Yew EIS is a public disclosure document that will portray information and analysis regarding Pacific yew, its habitat and its resource uses. It will also describe the anticipated impacts to the environment resulting from alternative yew management scenarios. In addition, the August 1992 Pacific Yew Conference provided a forum for information sharing regarding all aspects of Pacific yew, taxol, and the potential for treating cancer. It served to increase understanding of the issues, promote interaction among participants of diverse backgrounds and publicize recent developments in taxol production and information about the Pacific yew resource.

B. Need to Consider: Groups, organizations and agencies that especially should be informed and involved.

Background: In addition to the desirability of involving all interested and affected parties, various laws, regulations or policies require interagency coordination or consultation where agencies are likely to be affected or have jurisdiction or expertise concerning the issue. Also, various groups and organizations have established themselves as affected interests or as having special expertise through intensive involvement with the same or similar issues currently under consideration. In the interest of developing effective Pacific yew plans and programs, it is essential to make special efforts to involve these groups, organizations and agencies.

Past/Current/Planned Activities: Again, the public involvement and interagency coordination efforts employed for the Pacific Yew EIS and this strategy document have each addressed the issue of identifying and reaching appropriate groups, organizations and agencies that especially should be informed and involved.

C. Need to Consider: Topics that are of most concern and interest.

Background: An effective public education and involvement program needs to first determine which topics are of most concern and interest to intended audiences, as well as which concepts are essential for developing a common understanding of the issues involved. From that basis, all participants can more effectively contribute toward joint resolution of agreed upon issues.

Past/Current/Planned Activities: Both the Pacific Yew EIS scoping process and the Pacific Yew Strategy Document issues mailer were designed to solicit issues and topics of most concern to interested individuals, groups, organizations and agencies. The resulting documents serve to explain underlying concepts essential to understanding the issues of yew supply, ecosystem relationships and values.

In addition, the Pacific Yew Conference promoted dialogue among participants, as well as provided basic information on topics perceived to be of high interest based on public, media and institutional responses to the emerging Pacific yew issue.

IV. Summary

The Issues/Program table shows that a variety of current and planned programs address the many issues related to protection, management and use of Pacific yew for its medicinal and other values. From interim policies and guidelines to long-term research and management programs, Pacific yew is firmly established as a priority consideration in ongoing public land management plans and programs.

Overall, developing a truly comprehensive strategy as directed by Congress requires interdisciplinary input and analysis, cooperation among a variety of government agencies, and suggestions and information from the public. Any proposals for action need to be subjected to NEPA review to disclose the impacts of alternative means to meet the goals of Congress. The environmental consequences are then considered along with other factors in making the final management decision.

The single ongoing project that most directly follows the above approach to address the goals set by Congress is the joint USFS/BLM/FDA Pacific Yew EIS. In meeting the requirements of the National Environmental Policy Act, that project analyzes the environmental effects of an overall program of Pacific yew management on Federal lands, considering sustainable supply levels of Pacific yew for the medical community and for other uses. The ultimate decisions reached by each agency will fully consider the resource trade-offs and environmental consequences disclosed in the EIS in attempting to "ensure a sustainable supply of Pacific yew...with the least impact to the environment and to the Pacific yew resource."

Current or Planned Programs that Address Pacific Yew Strategy Issues

Current or Planned Programs	Issue[1] by Resource and Support Objectives																								
	R1					R2					S1												S2		
	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	F	G	H	I	J	K	L	A	B	C
Pacific Yew Admin. Policies		X									X	X	X	X	X	X	X	X		X		X			
Annual Pacific Yew Prog. Plan				X											X	X		X							
Interim Guides	X	X				X	X	X	X	X			X	X						X	X				
Pacific Yew Inventory	X	X				X						X													
Pacific Yew EIS	X	X	X	X	X	X	X	X	X	X	X		X	X				X		X	X	X	X	X	X
Resource Management Plans							X			X								X				X			
Existing Laws & Regulations		X				X					X				X		X	X		X	X				
Regeneration Activities					X	X													X						
Pop'n Viability Model (PNW)								X											X						
Continuing Research					X	X	X	X											X						
Pacific Yew Conference																			X				X		X
Port-Orford-Cedar Mgmt. Plan									X																

X = Issue is addressed in the current or planned program.

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[1] Issue Codes:
R1 = Resource Objective #1: To ensure a sustainable yew supply to the medical community, considering:
A: sustainable harvest levels under even flow or departure from even flow harvest programs
B: prioritization of harvest areas
C: how taxol from yew parts other than bark or from synthetic production might affect demand and sustainable supply levels
D: how demand, processing capability and harvest levels interrelate
E: viable regeneration options and advantages/disadvantages of increasing yew production

R2 = Resource Objective #2: To ensure full consideration of ecosystem relationships in Pacific yew management plans and decisions, considering:
A: inventory, demographics, reproduction and existing and historic range of Pacific yew
B: the role of Pacific yew in the ecosystem
C: maintaining viable yew populations and genetic diversity
D: effects on and from other plants and animals via yew management
E: cumulative effects of yew management activities with other management activities on adjacent and intermingled lands

S1 = Support Objective #1: To effectively administer a Pacific yew program that adequately addresses the issues of yew supply, ecosystem relationships and values, considering:
A: ways to eliminate or significantly reduce unauthorized yew removal or damage
B: the potential sensitivity of yew location information
C: administering yew sales and harvests in association with timber sales or as a separate activity
D: procedures for administering yew sales and harvests where yew trees are widely dispersed or in remote areas
E: utilizing parts of yew trees, not currently deemed to be feasible sources for taxol production, for other purposes
F: determining budget and staffing needs for the yew program
G: determining yew sale prices
H: relationship of the yew program to other laws, regulations, plans, policies and programs
I: keeping up with and incorporating evolving knowledge and technology
J: preparing, issuing and monitoring compliance with permits/contracts
K: designing and administering yew management activities to minimize conflicts and maximize compatibility with other resources
L: cultural and traditional values of Pacific yew

S2 = Support Objective #2: To provide appropriate public education, information and coordination to ensure adequate attention to issues of yew supply, ecosystem relationships and values, considering:
A: the level and types of public involvement that would most effectively support development and administration of yew management plans and activities
B: groups, organizations and agencies that especially should be informed and involved
C: topics that are of most concern and interest

PACIFIC YEW STRATEGY TASK FORCE

Name	Title	Office
Phil Stanbro	Task Force Lead and Branch Chief	OR/WA State Office, Branch of Lands, Recreation & Planning (OR933)
Hank Harrison	Lead Forester	Arcata Resource Area, Ukiah District, California
Mark Craig	Forester	Cottonwood Resource Area, Coeur d'Alene District, Idaho
Kevin Freeman	Special Agent	OR/WA State Office Law Enforcement Staff (OR914)
Kent Tresidder	OR/WA Pacific Yew Coordinator	OR/WA State Office, Branch of Forestry (OR931)
Jerry Magee	Environmental Protection Specialist	OR/WA State Office, Branch of Lands, Recreation & Planning (OR933)
Elena Daly	Area Manager	Clackamas Resource Area, Salem District
Kirk Casavan	Forester, Silviculture Staff	South Umpqua Resource Area, Roseburg District
Harvey Koester	Forester, Genetic Tree Improvement Program	Medford District
Frank Bedajewski	District Pacific Yew Specialist	Medford District
Al England	District Tree Improvement Specialist	Coos Bay District
Carole Jorgensen	Wildlife Biologist	South Valley Resource Area, Eugene District
Lou Whiteaker	Botanist/Ecologist	Klamath Falls Resource Area, Lakeview District
Fred Page	USFS Region 6 Yew Coordinator	USDA Forest Service Regional Office

END

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